ATHENS.

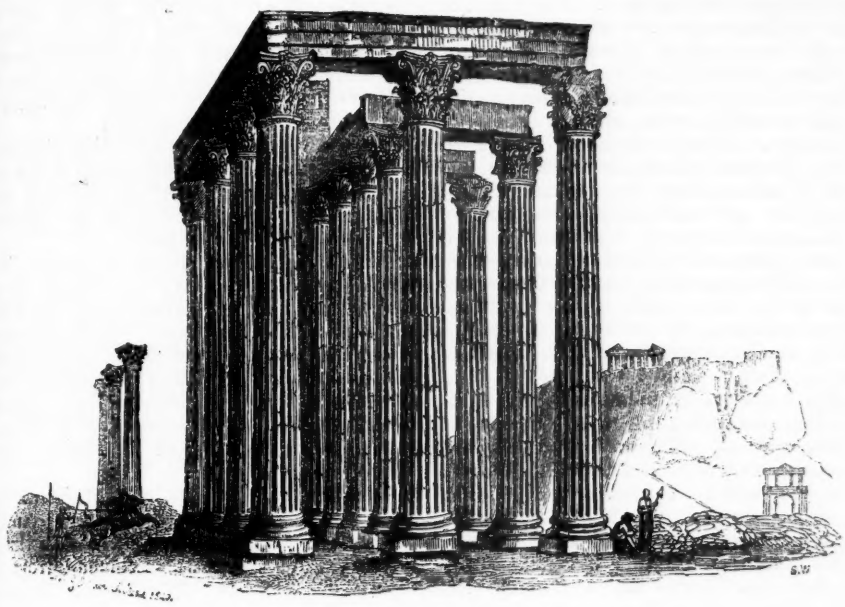

FIG. 1.—*Ruins of the Olympieium.*

FIG. 2.—*The Acropolis Restored.*

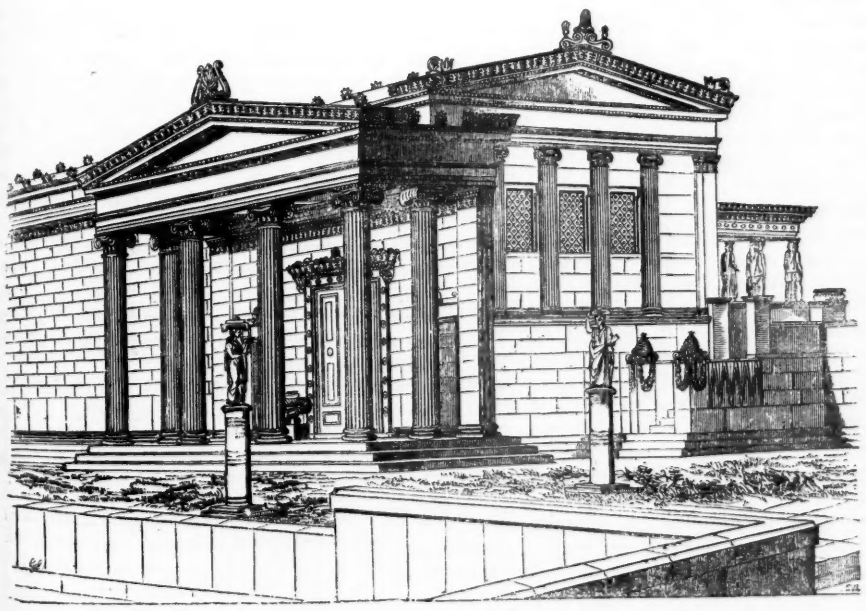

FIG. 3.—*The Erechtheium Restored; viewed from the north-west angle.*

domestic architecture of Athens became more cultivated. "Formerly," says Demosthenes, "the public had abundant wealth, but no individual raised himself above the multitude. If any one of us could now see the houses of Themistocles, Aristides, Cimon, or the famous men of those days, he would perceive that they were not more magnificent than those of ordinary persons, while the buildings of the State are of such number and magnitude that they cannot be surpassed."

In book vi. chap. 10, of Vitruvius, is found the only regular account we possess of the arrangement of the Greek house, and that is but short and unsatisfactory; and the epoch to which such description might apply is wrapped in doubt. Much difference existed between the town and country house, but there were two leading features in all the houses of superior class, namely, one or more open courts surrounded by rooms, and the division of the house into two portions, namely the Ανδρωνιτις for men, and the γυναικωνιτις for women. These divisions were on the same floor.

The conclusion arrived at from the scant passages of Homer are the same, with the difference only of the women's apartments being on an upper floor, and with the addition of a great court in front of the house. But the whole of the information we possess on this subject is discussed in Dr. Smith's "Dictionary of Greek and Roman Antiquities."* One inference is plain, that it was in their public buildings alone that their architectural grandeur consisted.

According to the position of the walls of the Asty as we have described, and as shown in Dr. Smith's plan, the Acropolis stood in the centre of the city. Within its space was concentrated all that art could offer. It was to this revered sanctuary that the Panathenaic procession moved its majestic length once in four years, its chief object being to carry the *peplus*, or embroidered robe, to the goddess Athena Polias in the Erectheium, as contradistinguished to Athena of the Parthenon.

The Acropolis (fig. 2) being a citadel, was fortified, the original walls being ascribed to the Pelasgi, and after its capture and destruction by the Persians, the foundations no doubt remained, and the name Pelasgic continued to be applied to a portion of the fortifications to a late period. When the Athenians returned to their city, after the Persian occupation, they commenced the restoration of the walls of the Acropolis and of the Asty. The road up the western slope of the Acropolis led from the Agora, and was paved with slabs of Pentelic marble. At the summit, Pericles caused a suitable entrance (Προπυλαια), to be erected by the architect Mnesicles, which resulted in the building known as the Propylæa. We need not recapitulate the well-known features of this building — its two Doric hexastyle porticos facing eastward and westward, with their central ditriglyph intercolumniation, — the two unequal wings, with their porticos in antis, facing each other,—the marble ceiling of the west portico, 50 feet deep, supported upon its six elegant Ionic columns, &c. There is no sculpture forming part of the design of the Propylæa. "The present ruined state of the whole," says the dictionary of the Architectural Publication Society, "is owing to its position, which necessarily made it a fortress from the Middle Ages, till the time of the War of Liberation, during the progress of which both the Propylæa and the vast portico of the Parthenon suffered deplorably."

The little Ionic amphiprostyle tetrastyle temple of Nike Apteros, on the west front of the south wing, though existing in 1676, has since been utterly destroyed, nothing remaining but some traces of its foundations, fragments of its masonry, and four slabs of its sculptured frieze, now in the British Museum. The subsequent discovery of its stones and most of the frieze have led to its re-construction on the original site. On the western front of the northern wing of the Propylæa, stands at present a lofty pedestal, 27 feet square, which from its size, probably supported equestrian figures, and agrees with a passage in Pausanias, descriptive of such.

Towering in proportions as in locality over the rest of the Acropolis, stood the Parthenon (Παρθενών), the Temple of the Virgin Goddess Athena, built of Pentelic marble, and standing upon a basement of limestone. Its cella was amphiprostyle, and divided into two parts, the naos and opisthodomos, separated by a wall. In the naos was the Chryselephantine statue of Minerva by Phidias, and round it a row of twenty-three Doric columns formed aisles, the light being obtained from the roof. In the opisthodomos were four columns supporting the roof, probably of the Ionic order. The whole number of external columns was forty-six. The sculpture in the pediments represents the birth of Athena from the head of Zeus, and the contest of Athena and Poseidon for the land of Attica. The ninety-two metopes of the frieze contained, in high relief, the exploits of Minerva, the wars with the Centaurs and Lapithæ, and other subjects. The continuous frieze round the cella, beneath the ceiling of the peripterus,

* Published by Taylor, Walton and Maberly, and Murray, and already mentioned.

was also filled with sculpture representing the Panathenaic procession. Sixteen of the metopes, and a large number of the slabs of the frieze were brought to England by Lord Elgin.

The sculptures of the Parthenon form the subject of numerous valuable works. The stylobate, of three steps, upon which the temple stands, 5½ feet in height, is also of Pentelic marble. The investigations by Mr. Penrose, at the instance of the Dilettanti Society, awakened fresh interest in these time-honoured remains. The suspicion of deep thought and subtle refinement in optical principles before unnoticed; the fact, since satisfactorily demonstrated, of the curvature of the horizontal lines and inclination of the columns;—of varieties in the size of caps in the same structure, with positive evidence of great mathematical knowledge in the form of the mouldings, convex, concave, and compound, and especially in the hyperbolic entasis of the columns,—resulted in a minute investigation of the Parthenon, Propylæa, Theseium, and other buildings, in 1846-7. It was ten years prior to this, that Mr. J. Pennethorne discovered the curvature in the stylobate of the Parthenon, rubbish and want of convenience having concealed this fact, now apparent, so long from the world. The most important of the curves are those which form the horizontal lines of the building where they occur, such convex curves of the steps lying in vertical planes, and corresponding curves of the epistylia, in vertical planes, parallel to the steps.

The inward inclination of vertical surfaces is also satisfactorily established. "When we consider," says Mr. Penrose, "the long interval that elapsed between the visit of Stuart and that of Professor Cockerell, during all which time the entasis of the columns of the Parthenon was undiscovered, and that it was reserved for Professor Donaldson to establish the Vitruvian inclination of the columns, we need not be greatly surprised that this curvature in the horizontal lines was not found out until a still later period."

Vitruvius first calls attention to these matters in the chapter "De Substructionibus," in the passage beginning "Stylobatam ita oportet exæquari uti habeat medium adjectionem per scamillos impares," &c. recommending that the stylobate should have a gradual rise towards the centre from both ends, and the inconvenience arising from it to be obviated by means of *scamilli impares;* and further, that the abaci are to follow the direction of the upper members of the epistilium, which will follow the curve of the stylobate. The vexed question of the *scamilli impares* seems thus to be explained. Certain difficulties, owing to the various uses of the terms "Hecatompedon," "Opisthodomos," &c. are learnedly discussed in Dr. Smith's "Dictionary," and are well worthy of attention. Callicrates and Ictinus were the architects, and Phidias was appointed by Pericles to superintend this magnificent building.

Of very different style and form to the two buildings we have glanced at, was the Erechtheium (fig. 3), a temple intimately connected with the earliest legends of Attica, situate to the north of the Parthenon, and within a few yards of the wall of the Acropolis. It is difficult to arrive at a clear knowledge of the history of Erechtheus, called also Erechthonius. Homer describes him as born of the earth, and adopted by Athena, and by her installed in her temple at Athens as her companion! Poseidon Erechtheus was the name under which he was worshipped in the Erechtheium.

"The first and only conception of Athens and the sacred Acropolis," says Grote, "places it under the special protection, and represents it as the settlement and favourite abode, of Athena, jointly with Poseidon; the latter being the inferior, though the chosen companion of the former, and therefore exchanging his divine appellation for the cognomen of Erechtheus." The temple of Athena, in which he was interred, was named after him. It contains the statue of Athena Polias, or the guardian of the city, and was the tomb also of Cecrops. The building bore the general name of the Erechtheium, but, in fact, contained two temples, that of Athena Polias and that of the nymph Pandrosus, daughter of Cecrops;—the latter for this reason, that the infant Erectheus being entrusted to the care of herself and her sisters, Aglaurus and Herse, the two latter betrayed their trust, whilst Pandrosus remained faithful to it. This beautiful temple stood upon the site of the original one burnt by the Persians. Though commenced long before, this building could not have been completed till about 400 B.C. Its irregularity of plan forms a relief to the usual outline of the Greek temple. It had three porticoes of varied position; the principal one, facing the east, is a prostyle of six columns, five of which are still standing, the west end being terminated by four half columns in antis. The north portico is of four columns in front, and two at the sides, enclosing a highly enriched doorway to the cella of Pandrosus;—the third, to the south, is merely an enclosure, the roof of which was supported by six Caryatides, each 7 feet high, standing on a Podium.

In this building the curvature of the horizontal lines and inclination of the columns has not been detected. The whole of the building was executed with wonderful finish and delicacy, proving how well its constructors loved their task. The statue of Athena Polias was of olive wood, and its position was the cella, and in front was the golden lamp made by Callimachus, which was kept burning day and night: the position of the tombs of Cecrops and Erectheus, of the olive-tree and the Salt well, is matter for learned conjecture. The building was left in a most ruinous condition after the War of Liberation in 1821-27.

Amongst the minor temples and works of art that covered the surface of the Acropolis, we will only allude to the colossal statue of Athena Promachus (ἡ χαλκη ἡ μεγάλη Ἀθηνα), standing nearly opposite the Propylæa, of gigantic size, towering above the roof of the Parthenon, the point of its spear and crest of its helmet being visible off Sunium to ships approaching Athens. It was still standing in A.D. 395, and is said to have scared Alaric from his projected sack of Athens.

We must reserve our concluding remarks upon the subject of Athens until a future number.

VENTILATION, WITH ESPECIAL REFERENCE TO HOSPITALS.

Permit me to resume my observations on the interesting subject of ventilation, especially of hospitals, and to make some remarks on the reply which Mr. Rosser has given to my former communication.* I must be allowed to reiterate emphatically my previous statement, viz. that the true origin of infectious and therefore deleterious air in hospitals, &c. is to be traced up "to the general noxious malaria which is constantly passing off from the bodies of individuals labouring under the most severe and oftentimes malignant forms of disease," and not merely to carbonized air, which is only the product of exhalation from the lungs of healthy individuals congregated in any large edifices.

In hospitals, where ventilation is imperfectly carried out, we find that certain diseases, presenting a well-known type, originate in a ward, and traverse floor after floor; whereas in the association of numerous healthy individuals no malaria is given off, and therefore no disease of a peculiar type is generated.

Allow me to make a few remarks on this important subject. A condensed body of human beings shut up in a large edifice—as Exeter Hall,—will not only thoroughly contaminate the air, which should be used for respiration, with impure exhaled gases, but likewise with solid particles of human origin, detached and diffused through the respired atmosphere. Dr. R. A. Smith obtained 200 grains of condensed moisture from one window in Manchester after a concert; he burnt 150 grains, and a strong smell of human perspiration came off, continuing until the substance was dry. When this was heated, it smelt like burning flesh, and was very disagreeable. This product may be viewed as the impure exhalation from hundreds of healthy beings, and would not give rise to contagious disease. Neither can we find that such diseases originate from any putrefactive products which arise from the earth's surface. Diseases, such as fever, cholera, hospital gangrene, erysipelas, &c. are most probably "highly organized particles of fixed matter, which finds its way into the atmosphere, like the pollen of flowers, and remains for a time suspended in it,—a condition which is consistent with the admitted difficulty of reaching and destroying these bodies by gaseous chlorine, or with washing the floors as a disinfectant."—(Prof. Graham.)

"I have long been of opinion that the cause of endemic diseases, if disseminated in the air, must exist there, either in the condition of *solid particles*, or in a state allied to the vaporific form."—(Dr. R. D. Thomson.)

"The first material cause of cholera is a specific poison which may be present in all situations in India in a dormant state, but which requires for its development certain accessory causes, such as sudden meteorological changes; animal and vegetable effluvia; emanations from large bodies of men; effluvia from persons crowded into insufficiently ventilated buildings."—(Mr. Rogers, Surgeon of the Madras Army, 1849.)

There can be little doubt but that the morbific matter of such diseases is thrown off from the bodies of the sufferers, and passes into the air with the noxious gases which emanate from the skin of such patients. It will be an important inquiry, therefore, to ascertain the number and the character of such gases, and to obtain a practical acquaintance with their behaviour (if one may so speak), when they are thrown off from a human body, because in so doing we may follow the course of the animal poison; since the latter is to be found in the former impurity, just as the detritus of human excrement of the London sewerage is to be met with in the on-flowing muddy Thames water.

It may be observed, that the leading causes of sensible aërial impurity in the wards of an hospital, are the constant exhalation of the following gases: — 1. Phosphuretted hydrogen. 2. Sulphuretted hydrogen. 3. Carbonic acid. 4. Carburetted hydrogen. 5. Cyanogen, with some of its compounds. To those well acquainted with the penetrating effluvium of the first gas, I may remark, that it is recognised always in excess in the medical wards, where diseases of internal organs are present, especially in all affections of the liver, stomach, and bowels, and in fever, dysentery, &c. &c.; whereas the blackening of the lead plaster strappings used in the surgical wards to stumps after amputation, and to sloughing ulcers, &c. readily informs us of the prevalence of the second gas, whilst the stupor, headache, and sleepiness produced in a healthy person, who remains some time at the bedside of such patients, leave no doubt of the copious exhalation of Nos. 3, 4, and 5 gases. By a wise and mysterious provision in the economy of nature, all gases have a tendency to diffuse themselves into the surrounding atmosphere; they are governed by unalterable laws, and their diffusion cannot be "prevented," nor "retarded" by "scientific ventilation," as your correspondent implies, although they may be diluted by artificial means.

The diffusion of each gas is always inversely as the square root of the density of such gas (Prof. Graham.) Now the density of the gases enumerated as the special products of diseases in hospitals, is as follows, air being 1·000:—

No. 1. Phosphuretted hydrogen	1·240
No. 2. Sulphuretted ditto	1·171
No. 3. Carbonic acid	1·524
No. 4. Carburetted hydrogen	·559
No. 5. Cyanogen	1·806

Dr. Mitchell found that the law of diffusion of the gases was only feebly interfered with even when a thin humid membrane intervened between the gas and the pure air; thus to traverse the membrane,—

Ammonia required	1	minute.
Sulphuretted hydrogen	2½	minutes.
Cyanogen	3½	„
Carbonic acid	5½	„
Hydrogen	37½	„
Carbonic oxide	160	„

and a much greater time with nitrogen.

The law to which the diffusion of gases is subject appears to be misunderstood by many persons, if we may judge by the examples which they give us, and the analogies which

* See p. 662, vol. xiv.

they draw from such examples. It has been urged that the instance of the diffusive odour of camphor, musk, &c. may be employed as a type of the diffusion of gases, and that the scent of the drug is found to remain even some time after the windows and doors have been opened. This is a comparison brought forward on fallacious grounds. The odoriferous power of drugs depends on a volatile and essential agent, which appears to strike the air as sound does, and is conveyed as so many undulations from a centre to an indefinite circumference. This agent cannot be caught by the most subtle means, nor analyzed by the most experienced chemist; and it is a well-known fact that a grain of musk loses none of its weight after it has been exposed and has scented a large room for many months; whereas, a putrefying animal or vegetable substance emits certain noxious gases, which we can collect and analyze, becomes less in substance, and eventually decays or dwindles away through an unalterable law of dissolution or of putrescence. There are no gases evolved in animal putrefaction which are lighter than air, except carburetted hydrogen, and this is not by any means so common a pest in our wards as are phosphuretted hydrogen and sulphuretted hydrogen. It is a great error to suppose that hydrogen, the lightest of gases, is ever given off from human bodies as pure unmixed hydrogen; but, on the other hand, it is always combined with some base, the resulting product of animal putrescence, as phosphorus, sulphur, ammonia, &c. and with the exception of carbonic acid gas, it may be questioned whether any elementary gas, such as nitrogen, hydrogen, carbon, is really eliminated from the bodies of the sick and diseased in our hospital wards. Every patient suffering from a contagious disease, as typhus, becomes "a nidus" from whence contagion springs. If, therefore, the noxious particles which emanate from the body become mixed with the animal gases already enumerated, it is evident that whatever agent tends to dilute these gases, will also disseminate them rapidly into circumambient pure air, and thus render the morbific matter weak and innocuous. As there is no liquid poison which may not be rendered harmless by copious dilution with fresh water, so there can be no aërial poison, the action of which may not be similarly influenced by dilution with fresh air. The exhalations from putrescent animal surfaces are always specifically heavier than the upper warm strata of air of the ward, so that they are confined to the lower portion of the room, where, like oil floating on water, with pure air above, they stagnate, until copious streams of cold and lighter air glide along the floor from doors and windows, and thus the aërial poison is driven to the chimney-flues and to the ceilings. This fact is borne out by daily experience; for, if several diseases such as fever, hospital gangrene, pyæmia, &c. are crowded together in one ward, and ventilation is imperfect, the diseases usually spread. In one public institution with which I am acquainted there is a fever department, or "fever wards," and when these rooms become filled with such cases, fever shows itself in some of the attendants and servants; whilst in our metropolitan hospitals these patients are indiscriminately mixed with other cases, and yet we never hear of fever spreading. This beneficial result is not entirely owing, however, to the dilution of gases by good ventilation, but to the fact that the worst forms of typhus are counterpoised, in their baneful influence, by the pungent emanations of other diseases, as acute rheumatism, &c. or the fœtid exhalations of a sloughing back or a gangrenous lung; so that when "the spotted fever" raged in London in 1847, and our wards were unusually filled with such cases, the disease spread in two or three instances to the attendants; but it was to the attendants of the surgical patients, and not to the nurses who waited on the fever cases.

It has been observed, that "any agent which interferes with the integrity of the morbific molecule, destroys its capability of inducing a regular disease." The fact seems to be well authenticated (Boussingault), that the inhabitants of South America are enabled to withstand the attacks of endemic diseases by mechanical applications, such as veils placed before the organs of respiration, so as to sift the air from morbid solid particles, "which supports the view of the organic nature of malarious poison." (Dr. R. D. Thomson's "Researches on Cholera.") It is, therefore, probable that by such an indiscriminate mixture of endemic diseases with other sufferers, the "*materies morbi*" is so altered in character that it is robbed of its deadly power to propagate itself; not unlike the principle of Arnold's chronometer compensating-wheel, where "*Elementa suis armis devicta,*"* and one metal expanding in a hot climate is counterbalanced by another which contracts in the same temperature.

But to return to the subject of the diffusive power of gases. The stagnant nature of all animal exhalations of a gaseous kind requires that the diffusive force of such gases should be aided by mechanical force, especially when these exhalations are the product of endemic diseases, which may spread through a community. Just as oil with water requires to be shaken vehemently together in order to diffuse itself, so does the aërial impurity now under consideration require to be beaten about from all quarters (if I may use such a phrase) by pure air, before it can be so diluted as to become no longer deleterious to healthy persons. Now the tripartite windows of the Middlesex Hospital are capable of being left open all night, without giving rise to a downward current, and the zinc perforations are rarely closed, unless the weather is intensely cold, and then such a measure is not wanted, as a low temperature is always coexistent with a scanty amount of fetid emanations.

Mr. Rosser observes, "Everybody knows that offensive smells are much less perceptible to windward than to leeward, and that the volatile gaseous exhalations from a coke fire are much less perceptible when there is a good draught towards the fireplace than when the draught is imperfect, and hence it would be reasonable to infer that the spread of infectious disorders is lessened by arrangements the tendency of which is to retard the diffusion [*dilution?*] of the '*materies morbi,*' and to remove them at once from the spot where they are generated."

This mode of reasoning is highly injurious, simply because it is based on fallacious principles, for I have already attempted to show that the poison of contagion is wrapped up in the bosom of other noxious exhalations of a gaseous nature, and that the rapid dilution of the latter can alone ensure the non-propagating influence of the former; and I would humbly suggest to architects and builders generally, whether the inattention to this grand principle in the generation of aërial impurities has not led to so many serious errors in ventilation in our public asylums, &c. &c. "There are many facts," observes Dr. Arnott, "to show that the impurity of retained breath, scarcely heeded in general, has been the chief element of the foul atmosphere which has led to cholera outbreaks. Thus, in England, it has been in public institutions, clean to the eye, not very offensive to the nose, and where the inmates were well fed and well clothed, and otherwise well cared for under frequent public inspection, but where ventilation was overlooked and defective, that some of the most shocking scenes of destruction from cholera have occurred; such was the school at Tooting, of 1,000 parish children, among whom about 300 cases of cholera suddenly occurred; and various union workhouses, lunatic asylums, prisons, &c. in London and elsewhere, were similarly visited: such places in the end of 1849, produced more than half the cases of cholera." The very crowded school of the union-house at Taunton, became a remarkable example, where thirty cases suddenly appeared in the room of the girls in which the glass windows remained entire, while in the adjoining room of the boys, where panes of glass were broken, and fresh air was admitted, not a single case occurred; and there was only one other case in the town.

Whenever, therefore, we can by ventilation drive the aërial impurities up the heated flue of a chimney, by the forcing, beating, slapping influence of a series of columns of pure air from all quarters, rushing towards the rarefied air of the fireplace, we then greatly diminish any tendency of contagious diseases to spread; the morbid matter, in lieu of becoming "retarded" in its diffusion, should be quickly and largely diluted, when we may inhale it with impunity, in the same manner that a tea-spoonful of Prussic acid in a wine-glassful of water would prove fatal to a healthy man, whilst more than a wine-glassful of the same poison, diluted in a gallon of water, would not prove in anywise injurious to a dozen sickly persons. It has been demonstrated that the virus of small-pox, cow-pox, &c. loses none of its property by exposure to gases. It is evident, therefore, that the retardation of any gaseous impurity, which carries on its bosom morbific matter, will aid the latter to propagate its baneful influence. The extrication of sulphurretted hydrogen, one of the most poisonous gases with which we are acquainted, or of phosphuretted hydrogen, would not be followed in a marshy district by ague, but another agent must be present to give rise to miasm; and this agent is a certain morbid exhalation, now generally considered to consist of solid particles floating in noxious gases, and generated by vegetable decomposition in marshy lands, and by animal decomposition, and by endemic diseases amongst human beings.

I will now pass on to a brief notice of the excellent system of ventilation adopted in the east and west wings of the Middlesex Hospital. The boiler furnace and the laundry drying-closet furnace flues conjointly meet in the basement, and run up the east wing; outside this flue is a chamber, and at the distance of 6 inches from the ceiling of every ward is an opening into this chamber, so that it is computed that 10,000 cubic feet of impure air are extracted from each ward per minute. The same plan is carried out in the west wing by a coke furnace only; and this system, aided by the tripartite windows, has rendered the wards so sweet that, to quote a remark once made by a visitor, "You may come into the wards blindfolded, and you would not discover any appreciable difference between the air in them and in that of the passages."

In conclusion, let me quote a well-known authority on this subject:—"To form just conceptions of what ventilation is, and of how it is in general to be accomplished, an enquirer has to consider that the ocean of air, called the atmosphere, which rests on the surface of the earth, and at the bottom of which men live, as certain aquatic animals live at the bottom of the sea, is about fifty miles high or deep, and that the portion of this ocean which can be contaminated by any process of animal or vegetable life, or by the decomposition of organic bodies when dead, may be regarded as less deep generally than the fiftieth part of one mile, estimated from the surface of the earth. This comparatively insignificant layer or stratum, therefore, may be regarded as the home or lurking-place of all epidemic diseases and insalubrious air, the more exact statement, indeed, being that these are generally confined to the still much smaller portions of air contained in houses or other inclosed places. Then the fact is to be kept in mind, that the whole mass of atmosphere at any moment over a city or other place is always travelling away to leeward with the speed of the wind, and is carrying with it whatever impurity may ascend from below, which impurity is then resolved quickly into the pure elementary oxygen, carbon, &c. of which all effluvia consist. Man can no more contaminate permanently the deep atmosphere over him by his proceedings at the bottom of it, than he can contaminate the Atlantic Sea, by what he may do on the shores. Then he has to learn that with the same mechanical certainty, as he can substitute the pure water of a passing tide or river stream for defiled water near the shore, he may substitute pure air from the atmosphere for any air near him that has become unfit for his use."—(Dr. N. Arnott.)

I will close this communication by observing, that to the practical working of the present system of ventilation adopted at the Middlesex Hospital, since 1849, to the substitution of non-absorbing Parian cement for the old plaster walls, and other valued improvements in the closets and scullieries, may be attributed, as a

* Arnold's prize essay's motto.

means, the entire absence of all endemic diseases, whilst the oft-repeated outbreaks of such calamities previous to these alterations, warrants me in saying that it is by far the most effectual system of ventilation that I am acquainted with amongst our public hospitals and asylums. GEO. CORFE, M.D.

Since writing the foregoing remarks, I have ascertained that the *Builder* has lately given a very favourable review of Mr. Robertson's excellent paper, read at the Manchester Statistical Society. In this *brochure*, Mr. R. speaks of the Middlesex Hospital as being nearer "a model" for hospital ventilation, than any public edifice of a similar nature with which he is acquainted in this country, and he emphatically denounces mere "scientific" ventilation for hospitals, however admirably such a mode of aëration may be adapted for dormitories, &c. and that nothing but the ceaseless flow of the external air through the wards, can effectually carry off the fetor from ulcers, wounds, burns, and vitiated secretions from other sufferers. Such an arrangement as the zinc plates afford in many of our wards, Mr. R. speaks of in well-merited praise.

Permit me also to refer your readers to the sanitary report of Marylebone for November, in which Dr. Thomson has given some striking instances of disease and death arising from effluvia and imperfect ventilation, ten years ago, in the very establishment which Mr. Robertson has now, in its remodelled state, spoken of in such high terms.

ARCH, CONSTITUTION-HILL, GREEN-PARK.

THE Iron Duke, on the Corinthian Arch, has been so long a *fait accompli*, that we may regard him as a fixture for aye in his elevated position, however ill-chosen by those in authority.* Would there be anything amiss in now completing the ornamentation of the arch, to correspond with the equestrian figure which surmounts it?

I allude to the spaces between the pilasters on the body of the structure, left *en bossage* to receive trophies or other enrichment.

Much cost would not be occasioned by sculpturing on these rough blocks wreaths, to contain bronze inscriptions, simply and concisely enumerating the victories of the Duke.

See the completeness of the Parisian Arc de l'Etoile, in this as in its other details, and then look at the arch crowning Constitution-hill, and say whether there is aught to find fault with in the suggestion of Q.

STRENGTH OF IRON BEAMS: THE NEUTRAL AXIS.

MY attention has been called to a paper by Mr. Bell, on the "Strength of Iron," read at the Institution of Civil Engineers, an abstract of which is published in your journal of January 3rd.

In this paper there occurs the following passage:—"In regard to this subject, Mr. W. H. Barlow had alluded to the alternative hypothesis, that the neutral axis shifted its position as the beam became strained, and that when rupture took place, the neutral axis was 'at or above the top of the beam.'"

Mr. Bell, having referred, in another place, to my paper on the strength of iron, read at the Royal Society in 1855, I feel it necessary to correct the error in the passage above mentioned.

The words quoted by Mr. Bell do not occur in my paper, but are taken from a book of my father's (Professor Barlow), written many years ago, before the tensile strength of cast-iron and the position of the neutral axis had been clearly ascertained. Referring to the anomaly presented between the supposed tensile strength and the apparent resistance of the outer fibre, in a solid rectangular bar, when strained transversely, my father states, that even if the neutral axis be assumed to be at the top of the bar, the direct tensile resistance must be 10 tons per inch, in order to account for the strength exhibited, to which he adds the remark, that "*unfortunately the exact amount is not known.*"

In my paper I gave an account of experiments which I had made, and which established the position of the neutral axis by actual measurements of a large rectangular cast-iron beam, under various degrees of transverse strain. By these measurements the neutral axis was found to be in the centre of gravity of the section.

Having been the first person who ascertained the position of the neutral axis by *actual measurement*, and thus rendered it no longer a matter of opinion, but an established fact; and having published this fact in the paper alluded to by Mr. Bell; it is rather an inexcusable blunder on his part, that he should use my name as alluding to the neutral axis being near the top of the beam, and conclude by expressing an opinion (after the fact has been proved), that "there appeared to be no good reason for supposing *that the neutral axis shifted its position.*"

W. H. BARLOW.

CLASSIC *v.* MEDIÆVAL.

YOU will perhaps allow me to express my cordial approbation of what was said in your last number by Mr. T. Goodchild, in behalf of what, for want of a more precise epithet, must be designated Classic in unmistakable contradistinction from Mediæval. Still, though I heartily thank him for what he has said, I am by no means satisfied with it, simply because it was too brief to produce much effect, unless it prove that of stirring up others to come forward on the same side of the question.

The Classic, or I would rather call it the Neo-classic style, it being considerably modified from its antique original, is surely more in accordance with our present requirements, and likewise with the element of modernism or non-mediævalism in our sympathies with literature and art, than is a style formed and fashioned during a quite differently constituted state of society, of which it is now incongruously reminiscent.

At all events, before it can again be rendered, even in a tolerable degree, applicable to secular purposes of every kind—as we are told by its ultra-advocates it ought to be—Gothic must be greatly modified, perhaps almost metamorphosed, or soon would be so, were it to become employed on all occasions, even the most ordinary ones. When resorted to only in special and exceptional cases, where, after being carefully studied, its mediæval costume can be well got up, Gothic may serve the particular purpose; but it has now become an architectural exotic, and the making use of it is now too much like the affectation of archaism. Z.

CORK.

THE architectural doings at Cork have not been large lately; still, some little has been done. The Great Southern and Western Railway has been opened to the water-side within the past year; and a goods station—substantial buildings—being over 365 feet long by about 140 feet wide, built from the designs of the Company's engineer, Mr. Miller. The passenger terminus was designed by Sir John Benson. It consists of arrival and departure platforms, waiting-rooms, with the usual offices, a convenient space for cabs and omnibuses, so that passengers can be taken up or set down under cover: this is a colonnade, 200 feet long and 30 feet wide at each end, and 43 feet wide by 80 feet in length in centre. There are twenty columns, 14 feet 6 inches high, supporting the roof. The entablature is plain, with block in cornice, and a low attic to screen the roof.

The Cork Exhibition Building has been perpetuated by a more substantial building by the last-named architect, which is called the Cork Athenæum. The building has been in use some time. The colonnade at entrance is not yet erected, for want of funds.

The tower to the Roman Catholic cathedral is finished, but nothing as yet is done to the spire: the quoins and dressings and tracery are in limestone, well executed; the walling in the red stone of the district.

A new dock, 350 feet long, 18 feet water on sill, 60 feet gate, has been built by private enterprise. Mr. Wheeler is the proprietor. The works were carried out by Mr. Alexander Dean: the original design was by Sir John Rennie; but local circumstances caused Mr. Dean to modify and alter this somewhat. It is a very successful work.

Another dock has been also constructed by private enterprise on this river by Mr. Brown, with 24 feet water on sill, gates 80 feet 6 in. wide, in length nearly 400 feet. These works show the growing importance of this port.

A new Roman Catholic Church of St. Vincent de Paul has been opened also this year, built from a design by Sir J. Benson.

Queenstown has been very much built on within the last two years, but in a somewhat questionable style. The new Queen's Hotel is almost half window. Small drawn-up piers separate a multitude of openings, and to crown the whole, it is surmounted by a clumsy cornice and parapet. Still from the harbour the town looks much improved, and was lighted with gas for the first time on the 1st inst. The shops and streets of Cork are every day improving, and in some of the shop-fronts there are a character and style very creditable. They are about to rebuild St. Patrick's-bridge, which was carried away, or rather injured, by the great flood of 1853, in one arch of 180 feet span, in iron.

PROPOSED MEMORIAL CHURCH AT CONSTANTINOPLE.

IT will interest some of our readers to hear that forty-six designs have been sent in to the committee for the competition for the Memorial Church at Constantinople: several of them have great merits. An architect who has resided at Constantinople responded to our invitation, and expressed himself willing to give any information in his power to competitors. His intimation, however, came too late to be of service.

THE LIVERPOOL ARCHITECTURAL SOCIETY.

THE seventh meeting of the society was held on Wednesday, the 7th inst. the president, Mr. S. Huggins, in the chair, when Mr. J. A. Picton read an interesting paper entitled "Notes on Architecture in Holland, Germany, and Switzerland."

THE LIVERY HALL ABOUT TO BE ERECTED FOR THE CLOTHWORKERS' COMPANY.

THE view represented is taken from the south end of the room. The sides are each divided into five arches by piers with attached Corinthian columns. On the east side the arches will contain windows filled in with stained glass from the old hall, and on the west side there will be three entrances and two large open fire-places. The buffet will occupy the centre of the north end, and at the opposite end there will be a screen and music gallery.

The arches springing from the attic above the order will groin into the vault of the ceiling round each of the four sides, and it is intended to fill these with stained glass, with the royal arms and those of the principal city companies. In the spandrils will be figures in relief, emblematical of the most important commercial cities and towns of the United Kingdom.

The columns are to be of Peterhead or Aberdeen red granite, with grey granite bases, and capitals of Caen stone. The stylobate is to be of various English marbles. The ceiling above the vaulting will be framed in wood for the purpose of assisting sound.

The extreme length of the room will be 80 feet, the width and height both 40 feet,—a double cube.

It promises to be a fine addition to the Halls of London, and will worthily connect with the City the name of its architect, Mr. Samuel Angell.

In our last volume (p. 610) we gave a view of the exterior of the building, and some memoranda concerning the Clothworkers' Company. We may add that the late Sir Robert Peel and Lord Hardinge were both liverymen of the company, and that the present Mr. Justice Willes is at this time one of the members of the court and livery.

* We have better hopes.—ED.

THE HALL ABOUT TO BE ERECTED FOR THE CLOTHWORKERS' COMPANY, MINCING-LANE, LONDON.—MR. SAMUEL ANGELL, ARCHITECT.

RAILWAYS ON COMMON ROADS.

IT has been well observed by an eminent French engineer, in relation to locomotive facilities, that "to retrograde is sometimes a progress;" and this apparent contradiction of terms is really true in many instances.

It is undoubtedly applicable to the formation of a series of what may be termed secondary railroads, or tramways, on common roads, worked by horse-power, now energetically demanded by our French allies, and usefully employed in America;—for Brother Jonathan can go slick ahead, as far and fast as anybody when it suits his purpose, and retrograde with equal facility where an advantage is to be gained. And why not? Why should people deprive themselves of the pleasures and advantages of cheap conveyance, because they cannot afford to construct a spick and span new locomotive railway, with deep cuttings, high banks, showy bridges, and splashy stations?

It will not pay to make expensive locomotive railways everywhere, to every village and hamlet ambitious of being introduced into the world on a railway of its own: however, where locomotive lines cannot be made, tramways can, at one-tenth of the cost of the former, and quite as useful, if not so grand and noisy. Where it will not pay to put down a tramroad, the inhabitants must be content to jog on in the even tenor of their way as usual,—trudge through muck and slush, stick in ruts, or stop at home out of harm's way.

Where towns are placed at a moderate distance from the main trunk line, and the traffic would not be sufficient to pay for the construction of an expensive locomotive branch, they may be readily tied to the main artery by an improved tramway, and thus at small cost reap the benefit direct by railway transit.

It is better to have a serviceable tramway than be cut off from the main line; for a town in the latter predicament is isolated, checked in its progress, and kept behind the age, all for the want of a few yards of rolled iron!

Why should tramroads be despised in practical England, and ignored in London and its endless suburbs? Why should people laugh at the idea of *horse railways*—of tramways on our common roads? Perhaps because they are old-fashioned, and have been put in the shade by locomotive lines. But this is sheer nonsense. All are useful in their proper place. No one in his senses would recommend a horse tramway from London to Bristol, while he can fly along by the "Iron Duke" on the Great Western. But there are places where the Great Western dare not hope to penetrate: it is here precisely where the tramways take up the business, and would do a paying trade.

Many of our out-of-the-way places are worse off for cheap and easy conveyance than they were before railroads came into fashion: the grand trunk lines pass at a distance from them: coaches have been taken off the roads: conveyance is scarce; and inter-communication difficult. Much time is lost to the unlucky inhabitants of outlying towns, in trudging to and from the railways; some three or four miles away from them. Who likes to trudge to or from a railway station up dusty roads or muddy lanes? No one, certainly, if he can help it: even omnibuses are a bore, although put in the line of route by cunning publicans and others for the special comfort and conveyance of their customers.

It is no unusual sight at a railway station to see half a dozen shaky omnibuses, with ricketty horses, and noisy cads, touting for customers on the arrival of a train at a place where passengers disembark to find their way to a town some miles away from the line. Here are half a dozen omnibuses and a dozen horses, where one good roomy omnibus and two horses would do equally well with a tramway. This is a waste of money, time, and power, which should be remedied by the introduction of the tramway.

Tramroads were invented long before steam and Stephenson came forth "to witch the world with noble horsemanship," and whirl through the wind at a mile a minute. They were, however, confined to bleak and dreary mining districts, or buried in the twists and twirls of our great slate quarries,—used for heavy loads of luggage, coals, ores, slates, and granite blocks, as on the Dartmoor tramway,—not for the conveyance of passengers,—pushed along by sweaty men and boys, not drawn gallantly on by horses *à la poste*. The carriages used were scrubby trucks, short, thick, and stumpy, with pullies for wheels just big enough to lift them clear off the rails or plates. No one ever dreamt of using them for passenger traffic, or of carrying them through towns and cities,—but why, is a mystery. They were neglected, and at last almost forgotten. No one thought of *improving* tramways, while they had locomotives to improve, spoil, or patent, as the case might be. They stood stock still in their native rudeness and rusticity, and looked as venerable as if they had been formed by Tubal Cain himself, in his 'prentice days; while railroads rushed a-head, and carved the country into gridirons, with rails and roads of every size and shape. Yet they have lingered in the memory; and now, after a grand flourish with the locomotive lines, enterprising men bethink themselves of the "old trams:" why not smarten them up; why not improve them; make them generally useful; put them where they have never been put before; go where their rivals cannot go, and, like the jackall, provide food and provender for the lion locomotive line?

Brindley said one day to a committee of grave wiseacres in the House of Commons, that "rivers were made to feed navigable canals;" and so we may say that tramways may be made to feed locomotive lines.

The "old trams"—with a new face, with new-fashioned flanged wheels (not pullies)—smart, roomy omnibuses for fifty people; good luggage-trucks properly built, and well turned out, *secundum artem*, in their most civilized form, will be readily patronized by the rambling public, in consequence of their comfort and economy. The Yankees have taken them in hand, and brought them largely into play. They are well known in many of the American cities, and in that land of progress are going rapidly ahead. Horse railways are found useful in America, and why should they not in England?

Our French neighbours have taken them up: engineers have devoted time and trouble to their improvement; and improved specimens of the "old trams" were exhibited in the "Palais de l'Industrie" during the last year's display. Many pamphlets have been written upon them, several patents taken out, many improvements made, and a line actually laid down in the Champs Elysées, Paris, to let the gallant Parisians see what can be done on common roads. Besides all this stir and "waking up," several companies have been started for the purpose of carrying the idea of horse railways into practical execution. Many of the principal cities of France, as Bordeaux, Rouen, Havre, &c. by the medium of their municipalities, have approved of the principle, and recognised the merits of the improved tramway system.

And why should they not? At Rouen, for example, when these tramways are laid down alongside the quays, merchandise can be at once received from the vessels, and sent direct to the railway outside the town, and thus bring the shipping into direct and facile communication with Paris; and the same arguments apply to the busy quays of Bordeaux, which, by means of tramways, will be united with the Cette, as well as with the Paris line. In this point of view improved tramways are exceedingly useful, and bid fair to be fully employed for such purposes on the Continent,—not only for merchandise, but for passenger traffic. Many lines, even of twenty and thirty miles length, have been carefully studied for tramways, and have been very favourably received by the French Government,—as little or no objection seems made to their being laid down on the imperial and communal routes of grand communication. The Belgians might naturally enough be expected to follow the French in these matters. Our worthy friends, the good Mhyneers of phlegmatic Holland, have even taken up the cue, rubbed their eyes, and cogitated, over their cups and pipes, as to the merits of tramways, and, what is more wonderful still, see no objection to their introduction into their beloved land of ditches, dykes, and polders. The worthy burghers of Amsterdam approve,—Mhyneer Van Dunk himself nods assent,—then why should not the Londoners and men of "Cheape" give the "trams" a fair and honest trial?

The improved tramways must neither be confounded with the cheap go-a-head "plank" roads of America, nor with the rolled plates of our old collier trams. They are now, in fact, complete railways, with a guard-rail and flanged wheel to the vehicle traversing them, so that they really possess all the advantages of a rail as used on locomotive lines; their form, however, being very different. The best form is that patented by Monsieur Loubat, civil engineer, and employed by him in the line traversing the Champs Elysées, from the Place de la Concorde to St. Cloud. In appearance it is something like a semi-circular gutter, but on closer inspection it will be seen to consist of a rail and guard. The wheels of the omnibus which are flanged, run on the rail—and not in the hollow part of the gutter, as it may be called. Although placed in the common road, crossed and re-crossed in every direction by the continuous traffic, it never becomes choked, nor offers impediment to the free passage of the omnibuses specially made to run up it. It offers no obstruction whatever to the other traffic, and, in fact, is scarcely seen on the road, as it is level with its surface; and, in fact, forms an integral part of it. A simple rail would not answer the purpose on a common road: a plank road would be worse than useless, and the old plate trams, with their sharp upright flange, would be dangerous for horses, and easily damaged by the passing traffic, which is not the case with the improved tram-rail. The carriages are large, and capable of carrying forty or fifty passengers, which run lightly along the rails, and are easily worked with two horses: they are made back and front alike, with a shifting pole, so that when they arrive at their journey's end, the pole is shifted, which saves the necessity of turning, or using turn-tables. In case of necessity arising from any obstruction on the road, they can be readily thrown out of the rail, pass the obstruction, run on to the rail again, and so continue their way without let or hindrance, which is a very useful feature in the improved tram-rails as now employed in France.

These kinds of railways,—for after all they are really railways,—may be advantageously employed, especially on the continent, where the grand net-work of railways is not so closely interwoven as in a small country like England. They will make admirable tributaries to the main lines, and give great locomotive facilities where none now exist, in consequence of the distance of the main lines from many of the neighbouring towns. They are of easy application in Holland, many parts of Belgium, Northern Germany, and would render good service to Russia. As the principal roads in France are under the control of Government, there are no old-fashioned, cumbersome "turnpike trusts," as in England, to throw obstacles in the way.

The French Government admits the utility of the principle, and will not raise objections to well-selected lines, on any of the *routes impériales*. They have latterly made much way, in the estimation of the communal and departemental authorities, who have not thought the subject beneath their notice, or unworthy of discussion in their councils.

The question relative "*à l'établissement sur ces deux lignes du système de chemin de fer avec chevaux*," has been discussed and approved in the "*Conseil générale*" of the departement, *du pas du Calais*, as well as in many others of these important assemblies.

The municipal councils have not been behindhand in these matters; for, in many of the principal cities, they have been freely discussed, and their utility as well as economy fully admitted; and, in more than one of the great commercial cities of France, plans and estimates have been made for laying down tramways to connect their quays and busy centres of trade with the trunk railways, and thus reap the advantages of railways where locomotives cannot conveniently or economically penetrate.

The expense of permanent way laid down complete on longitudinal bearers, of size suitable to the rails, does not exceed 25,000 francs (1,000*l.*) per kilomètre, and any experienced

contractor in France would be glad to furnish a line complete, including rolling and working stock, for 50,000 francs, or 2,000 francs the kilomètre. This is in fact a rather high estimate, and they may be laid down complete for 35,000 to 40,000 francs the kilomètre, whereas a locomotive line could not be executed under 250,000 francs, or 10,000*l.* the kilomètre. And since the traffic in the two lines would be pretty nearly equal for most places where trams would be useful, the economy and pecuniary advantage is evidently in favour of the trams. Then why not employ them more freely—why not bring them into use more rapidly, and open up new facilities for locomotion and inter-communication?

Their safety is indisputable, and speed sufficiently great for ordinary purposes. The ordinary rate of baggage-trucks is from ten to twelve kilomètres the hour, and for passenger, from twenty to twenty-four kilomètres, which is quite fast enough for ordinary purposes, where tramways can be judiciously employed. No one of course would pretend to put them in competition with locomotive lines: they are not designed for any such purpose: their object is to open up new fields of traffic to feed the grand lines, especially where locomotive branches would not pay for working; and in this alone consists one of the greatest merits of the principle. Rivers are fed by minor streams flowing into them; and so are trunk lines by branches; and a large stream of traffic may be made to flow into them, through the small but useful channel of well-selected tramways. They are found useful in France and America, and why not in busy, bustling, restless England? Time will bring them into favour, though now despised in the native land of railways.

What can be said of their eligibility for London? The "leading journal" has not considered them beneath its notice: it has devoted more than one of its forcible leaders to call attention to them, especially as to their applicability to London. It has pronounced, there are no "engineering difficulties" in the way: this may be true in principle, but not in detail. There would be difficulties in bringing them down such places as Fleet-street, Cheapside, and the Poultry; not difficulty of construction, certainly, but of economical application and obstruction. They might be readily and usefully applied in our great suburban routes, as Mile-end, Bayswater, City-road, Islington, Kensington, Wandsworth, Edgeware, Vauxhall Roads, and similar lines. They could easily be laid down from London-bridge to the Crystal Palace; and as each omnibus could be made to carry sixty or seventy people, they would be very useful in dividing the traffic to that attractive place; for at present it is rather difficult of approach, notwithstanding the railway at London-bridge, and its inconvenient crush-room. They may be made useful anywhere, even in a densely-crowded city like London; but there are other places where they would be far more useful, and at the same time more profitable.

The question of "Horse Railways" has been taken up by men of eminence and ingenuity in France; and ere long, I have no doubt, from the rapid strides they are making in public estimation, that they will be more generally employed than at present; and that when once the impulse is fairly given, its march will be continuous and onward. They will be improved as they advance in favour; and, when their merits and utility are better known, they will be better appreciated, even in England.

JOSEPH LOCKWOOD.

COMPENSATION CASE, NORWOOD.

ON Friday, the 9th instant, an inquiry took place before a jury, at the Sessions House, Newington, as to the value of 4½ acres of land and ornamental water, at Norwood (by the cemetery), belonging to Mr. T. E. Savage, taken by the Crystal Palace Railway Company for the site of the railway adjoining south to the viaduct, which shows the increase in the value of land there. The plot of land in question was purchased by Mr. Savage in 1840, by auction, for 340*l.* On the part of the claimant, Mr. Wm. Allen Boulnois valued it at 4,752*l.*; Mr. Edward I'Anson, at 4,424*l.*; and Mr. Edwin Nash, at 4,438*l.* On the part of the company, Mr. Charles Lee valued it at 799*l.*; Mr. R. A. Withall, at 761*l.*; and Mr. Wm. Rogers, at 766*l.* The jury gave for the whole, 1,200*l.*

MATHEMATICA QUÆSITA CUM EXPLICATIONIBUS.

PERHAPS you may consider the tendency of the following resolved quæsita calculated to give them a place in the columns of your journal:—

Required the dimensions of a Norman window, of a given perimeter (a), *so that it may admit the greatest possible amount of light.*

The whole perimeter is denoted by a; let x represent the radius of the semicircular head of the window; then we have $\pi x =$ the circumference of the head; and the area of the window may be expressed by the function

$$(a - 2x - \pi x)\, x + \frac{\pi}{2} x^2,$$

$$= a x - 2 x^2 - \frac{\pi}{2} x^2,$$

which (by hyp.) must be a maximum.

Denoting the latter function by u, we have

$$\frac{du}{dx} = a - 4x - \pi x,$$

which $= o$, when $\overline{\pi + 4}.\ x = a$, and as $\frac{du}{dx}$ passes through $+, o, -$.

Therefore, when $a x - 2 x^2 - \frac{\pi}{2} x^2$ is a maximum, $\overline{\pi + 4}.\ x = a$; *i.e.* the whole perimeter equals the circumference of the semicircle, and twice the diameter of the semicircle, of which the base of the rectangular part of the window is equal to the diameter, and, therefore, the sides of the rectangle taken together are equal to the remainder, which is the diameter. Therefore, the side of the rectangular part of the window must be equal to the radius of the semicircular head.

Required the height at which a gas-burner should be fixed above a table, so that a small portion of the surface of the table, at a given horizontal distance (a) *from the light, may receive from it the greatest degree of illumination.*

The given horizontal distance $= a$. Let x denote the required height, r the distance from the origin, ϕ the angle of incidence; then the degree of light

$$\propto \frac{\sin.\ \phi}{r^2}, \text{ and} = C \frac{\sin.\ \phi}{r^2}.\quad \text{Sin.}\,\phi = \frac{x}{r}, \text{ and } r = (a^2 + x^2)^{\frac{1}{2}};\ \therefore \text{ sin. } \phi = \frac{x}{(a^2+x^2)^{\frac{1}{2}}}, \text{ and } \frac{\sin.\ \phi}{r^2} = \frac{x}{(a^2+x^2)^{\frac{3}{2}}}.$$

Therefore $\frac{x}{(a^2+x^2)^{\frac{3}{2}}}$ must (by the hyp.) be a maximum. Taking the log. of this, and denoting it by u, we have

$$\log.\ x - \tfrac{3}{2} \log.\ (a^2 + x^2);$$

$$\frac{du}{dx} = \frac{1}{x} - \frac{3x}{a^2+x^2} = \frac{a^2 - 2x^2}{x\,(a^2 + x^2)},$$

which $= o$, when $x = a\sqrt{\tfrac{1}{2}}$; and $\frac{d^2 u}{dx^2}$ is negative; therefore u has a maximum value when $x = a\sqrt{\tfrac{1}{2}}$.

Cambridge. A. J. TOMPKINS.

PROVINCIAL NEWS.

Bardney (*Lincoln*).—The Bardney Wesleyan Day School, designed by Messrs. Bellamy and Hardy, of Lincoln, architects, was opened on 29th ult.

Stratford and West Ham.—It is intended, it is said, to erect workshops and factories for the London and Tilbury Railway, near Plaistow-grove, where it is also proposed to erect a station. The London and Tilbury line will cross the Leigh-road near Plaistow, and the value of property in this district has hence advanced in value.

Brighton.—The Pavilion Committee of the town council have made up their report on the appropriation of the Pavilion estate, from which it appears that they propose various improvements and alterations, at an estimated cost of 2,427*l.* for the pavilion, &c. and 7,618*l.* for the north property, making together 10,045*l.* which sum the committee suggest should be raised by a new loan for 57,000*l.* paying off the present debt, and extending the redemption of the new loan to thirty years, at 4 and 4½ per cent. By this plan the present rate will not be increased. The committee state that they feel confident the Pavilion estate, thus applied, will realize in point of revenue the expectations of the most sanguine. A suite of reception-rooms, music-hall, and antheum, or conservatory in the dome, free public library, museum, and picture-gallery are all comprised in the projected improvement of the property.

Gloucester.—The new corn-exchange was opened on Saturday in last week. Owing to the irregular form of the ground upon which the building stands, and the narrowness and obliquity of the frontage, a departure from the ordinary rules of street architecture was necessitated. In order to avoid interference with some established lights on the north side the building was set back, and a circular portico thrown out to the extent of the line of frontage. Four detached Corinthian columns, with two pilasters, 26 feet high, support an entablature of the same order, on the top of which is a balustrade, surmounted in the centre by a colossal figure of Ceres. Carved vases are placed on the balustrade immediately over the four columns, the centre space being filled in with the city arms. The total height from the pavement to the top of the figure is about 50 feet. The entrance to the corn-exchange is through a corridor 13 feet 6 inches wide, paved with Minton's encaustic tiles; on one side of which are the offices of the city surveyor and his assistant, with a staircase communicating with the upper floor, on which are located the town clerk and the clerk to the Board of Health. The dimensions of the corn-exchange are 62 feet by 52 feet, and the height from floor to top of lantern 45 feet. A committee or settling room is attached to the corn-exchange, measuring some 32 feet by 14 feet. The corn-exchange is intended to be used for concerts and public meetings of all kinds: it has, therefore, been fitted up with gas. The exchange is heated by hot water, on Haden's principle, by whom the work has been executed. The contractors for the exchange are Messrs. Jones and Son. The carving is by Mr. H. Frith, of this city. The architects of the building and the general market are Messrs. Medland and Maberly.

Neath.—The foundation-stone of Alderman Davies's Charity Schools was laid last week. The schools are to be built in the Early English style, and will provide accommodation for about 600 scholars. The architect is Mr. E. Moxham, of Neath.

Leicester.—A memorial has just been erected at Bow-bridge, Leicester, whereon it is recorded that near that spot lie the remains of King Richard. It is set in the gable of a new building there. The monument is in Kelton stone.

Birmingham.—The opening of the Adderley-park Library and Museum took place on Monday in last week. There was a dinner, the proceedings of which were not open to reporters. At the dinner were present—Lord Lyttelton, Lord Leigh, Sir Robert Peel, bart. M.P.; Mr. C. B. Adderley, M.P.; Mr. J. Ratcliff, mayor of Birmingham, &c. A feature of the proceedings was the presentation of a testimonial to Mr. Charles Ratcliff. The testimonial consisted chiefly of a piece of plate.

Edgbaston.—The new vestry-hall, for the parish of Edgbaston, has been recently completed. The architect was Mr. F. W. Fiddian, and the builder, Mr. John Cresswell. It is calculated to hold about 400 people.

Liverpool.—There are various street buildings of some pretensions in progress, and for some account of which we are indebted to the *Albion*. The large structure belonging to the Liverpool and London Insurance Company, on the site of the old police-court, in High-street, adjoining the Exchange-buildings, and occupying the frontages to Exchange-street East and Dale-street, is far advanced. The style is Venetian Renaissance. The plan consists of four blocks of buildings—the south wing, fronting Dale-street, with an entrance opposite Moss's Bank;

the north wing, fronting the Exchange-buildings; and the central buildings in High-street and Exchange-street East. These four blocks have an open area in the centre (to be covered by a glass roof), which not only gives light to the inner portions of the structure, but furnishes ready means of access to the various floors by steps and galleries. The second floor will be supported by cast-iron columns, rising from the basement, and bearing cast-iron girders, between which and the floor fire-proof brick arches will be formed. A number of these columns are hollow, and are made to serve as chimney-flues. The plinth of the building is granite, supplied by Newall and Co. of Dumfries; and the external masonry is Darley Dale stone, of which St. George's-hall, the Branch Bank of England, and other edifices in the town have been constructed. The arches over the entrances in Dale-street and High-street, and the carvings, are in Caen stone. The masonry to the ground-floor story consists of large blocks of stone, the piers which carry the arching to the ground-floor windows being in one stone from window-sill to impost, measuring about 4 feet wide and 8 feet high. In the principal entrance, in Dale-street, there will be a doorway of polished red granite, supplied by Mr. M'Donald, of Aberdeen. It will consist of two Doric columns and entablature. Over the entrance to the basement, from Exchange-street East, there are some large York landings, one of them being upwards of 13 feet by 9 feet, and 8 inches thick. These, and the masonry in general, were raised by two travellers, or jemmies, on a double set of staging. The building, when completed, will be 60 feet high. It covers an area of about 1,500 yards. The cost of the land was upwards of 70,000*l.*; and the contract for the erection is over 35,000*l.* to which there will be some slight additional cost. The carving is chiefly by Mr. Stirling, of Liverpool, portions being in the hands of Mr. Nicholls, of London, who executed the carving for St. George's-hall; the masonry, by Mr. Wells, of Liverpool; the carpentry, by Messrs. Haigh and Co. the sole contractors; and the brickwork, by Messrs. Jump and Son. Professor Cockerell is the architect.——The new block of offices on the site of the old iron warehouse, at the bottom of Water-street, belonging to Sir Joseph Bailey, is also ready for the first floor, and the cast-iron columns and girders are fixed for its reception. The style of this building is perhaps more that of Florentine Renaissance than anything else, although very freely treated by the architect, Mr. Councillor Picton, of Liverpool. The ground-floor is slightly Gothic in its treatment. The grand entrance from Water-street has a polished granite doorway, surmounted by sculpture, representing a wreath of fruit and flowers, the design for which is borrowed from St. George's-hall. The Venetian windows have polished red granite pillars, with capitals, composed of natural foliage, conventionally arranged, designed by Mr. Picton and his son, as stated by the former gentleman at a recent meeting of the Liverpool Architectural Society. Mr. Hugh Yates has the contract for the masonry; Messrs. Jump and Son, the brickwork; and Mr. Borrows, the carpentry.——Mr. Picton, who, adds the *Albion*, is professionally doing so much to beautify and ornament the town, has also erected the new pile, in the Italian style of architecture, at the corner of Rumford-street and Water-street, for the Cunard Company.——Another block of stone buildings, the property of Mr. John Naylor, banker, is being erected in Oldhall-street, covering about an acre of land. The architect is Mr. J. K. Colling, of London, who restored Hooton-hall. He has made a very free treatment of the Renaissance, with Arabesque variations. There is a central area, having a grand entrance from Oldhall-street, with blocks of buildings ranged around. Messrs. Holme and Nichol are the contractors, and Mr. Parker has the masonry. The design for this building was in the Architectural Exhibition in London.——The Roman Catholic cathedral in St. James's-street, for which Mr. Pugin is the architect, is progressing gradually.

Perth.—Government, it is said, has accepted tenders for the erection of extensive additions to the General Prison at Perth, which will cost nearly 30,000*l.* The works will consist of a new wing of four stories or galleries, containing 204 cells, with suitable association-rooms for the confinement of female convicts upon the principle of association: improved accommodation for juvenile prisoners will also be provided, and the chapel is to be enlarged. The plans were prepared by Mr. Matheson, architect for H.M.'s Board of Works, and operations will be immediately commenced.

CHURCH-BUILDING NEWS.

Castle Rising.—The restoration of the chancel of the church of St. Lawrence, Rising, was completed on New Year's day. This work is supplementary to the complete restoration of the nave and tower some years since; and the only part of the building now requiring re-edification appears to be the south transept, of which no remains are visible except the beautiful arch which formerly opened into it from the tower, but is now blocked up. In the chancel restoration, the style of architecture throughout adhered to is the Early English. The walls have been re-cast and partly rebuilt, the old roof removed, and replaced by a new one at a higher pitch, covered with lead, with gable copings and cross. Internally the roof is of English oak, raised upon a carved stone cornice having a running ornament of three different patterns. A new lancet window has been inserted in the north wall, filled with painted glass by Mr. Lamb, of London. Thus with the two new windows on the south side, and the three-light eastern window, already existing, the chancel is entirely lighted with painted glass. The reredos consists of five elaborately diapered panels of Caen stone in an arcade, the shafts of which are of dark-coloured Devonshire marble. A similar arcade is continued along the eastern wall, meeting, on the north, the credence-table, and on the south the piscina and sedilia. The flooring of the chancel is of Minton's tiles. The chancel is warmed by hot water, the pipe trenches being covered with perforated tiles, patented, we understand, by the brother of the rector. An improvement has been effected by the removal, from the chancel into the tower, of all the monumental tablets, the memorial of the late Colonel Howard being also removed to the otherwise nearly blank north wall of the nave. The whole of these works have been executed at the sole expense of the Hon. Mrs. Howard. The builders employed were, for the stonework, Mr. Brown, of Lynn; and for the woodwork, Mr. Taylor, of Norwich. Mr. Street, of London, was the architect.

Worcester.—The consent of Sir George Grey has just been obtained, to the land presented by Mr. W. Laslett, M.P. being used as the burial-ground for the city of Worcester; and Mr. Purches, the surveyor to the Local Board of Health, has received instructions to make a survey of the site, with plans, sections, &c. for the use of the Burial Board.

Nunton.—A monument has just been erected in the church at Nunton, by Messrs. Osmond and Son, of Salisbury, to the son of Major-general Buckley, M.P. who fell before Sebastopol. It is of Gothic design, and is embellished with military emblems.

Charlcombe.—A vestry meeting of the inhabitants of this parish was held on the 2nd inst. "for the purpose of taking into consideration the propriety of authorizing the rector and churchwarden to apply to the Bishop's Court for a faculty for restoring, repairing, and altering the parish church, according to the plans and specifications to be then produced, and also figuring a rate for the same. The churchwarden proposed "that the plan and specifications of Mr. Scott be adopted; that a rate, not exceeding 200*l.* be made for the purpose of carrying out the repairs; and that the rector be authorized to apply to the bishop for the proper faculty." The rector explained that Mr. Scott's proposition was, to leave the tower standing, to take down all the walls and the roof, but leaving parts of the porch and the Norman arch opposite the door. All the rest Mr. Scott had pronounced, through his chief manager, to be unsafe. After some discussion the resolution was agreed to by a majority of 14 to 3.

Ripley.—The Burial Board for this town have selected designs for their proposed erections' from those sent in in answer to advertisement. The designs chosen having been approved of by the bishop of the diocese and the Secretary of State, tenders were advertised for, and the result of those sent by five different builders was, that Mr. G. Roe's was accepted, he being some 40*l.* lower than the architect's estimate. The architect employed is Mr. Charles H. Edwards, of London.

Doncaster.—The town council have agreed to give the 4,000*l.* requisite towards the completion of the parish church, in yearly instalments of 1,000*l.* Mr. Denison, Q.C. guarantees the balance, towards which he gives 1,000*l.* The sculptured figure of the Saviour, in Portland stone, the production of Mr. Phillips, to whom the whole carving of the edifice, both externally and internally, has been entrusted, has been placed in the ornamental niche prepared for its reception above the great western window. The figure is nearly 5 feet high, in a sitting posture. The left hand holds an orb surmounted by the cross. The right arm is elevated, in the act of benediction. The figure is the gift of the architect.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE LATE JOHN BRITTON.

AT a meeting of the Institute of Architects, held on Monday evening, the 12th inst. Mr. G. G. Scott, V.P. in the chair, after the routine business, Mr. Digby Wyatt announced the death of Mr. Britton, an honorary member of the Institute, and read a sketch of his useful life, and a warm and well-written eulogium:—

"To estimate the value of John Britton's labours aright," said Mr. Wyatt, "we must remember that before his time popular topography was unknown. The ponderous volumes of county histories were valuable as record rooms, but useless as libraries. The text-books—Gough's 'Camden,' King's 'Munimenta Antiqua,' Cox's 'Magna Britannia,' and Buck's 'Castles,' were heavy and opaque. The facetious Captain Grose was the leading antiquary, and Gilpin furnished a sample of the florid style of picturesque description of scenes and localities. Price, Knight, and Repton, did much to draw attention to other details than those of genealogies and the descent of hereditaments. Any thing, however, like a fusion of the two styles had not been attempted at the period when John Britton commenced combining antiquarian with topographic description. The pictorial illustrations of our national monuments at the close of the last century were of the most loose and imperfect description. Since the careful prints of Hollar, scarcely any engravings of architectural subjects had appeared worthy of notice or reliance; and the early productions of the Antiquarian Society presented the only approximation to accuracy. James Basire, Rooker, and Lowry, were the fashionable engravers of such subjects; and John Carter, and Fowler, who illustrated stained glass and ancient mosaics, almost the only trustworthy draughtsmen. It was mainly through John Britton's energy that a reformation was effected. His activity and enthusiasm soon gathered about him all those rising men whose names are now so familiar to us. He saw from the improvements which had been effected, mainly by Stothard, and Heath, the engraver, the capabilities of copper-plate engraving; and speedily brought to bear upon the long neglected antiquities of the country, that artistic ability through the exercise of which they could alone be popularized. Samuel Prout, Frederick Mackenzie, Edward Blore, George Cattermole, W. H. Bartlett, R. W. Billings, Henry Shaw, and many more, were at various periods induced to bestow their earnest efforts upon the proper delineation of those views which were so successfully transferred to copper by the brothers, John and Henry Le Keux, and other engravers, for the most part pupils of Basire. Public attention was captivated by the excellencies of the engravings of the architectural antiquities of the land, and the excitement which at first took the form of vague admiration, has in our time reached its happy consummation in profound investigation into the true principles upon which they depended for grandeur and effect, and in a wise and wholesome spirit of conservancy. For much of this, the country is deeply indebted to that friend we have so lately lost. His labours were incessant, his memory extraordinary, his system admirable, his clearness of understanding, and liveliness of fancy in no common wise vigorous, his affections warm, his habits exemplary. Had he been less honest he might have been far richer; had he been more selfish he would never have benefited his country as

he unquestionably did. Were abundant time at my disposal, I could scarcely condense into an evening's discourse an enumeration of the great variety of subjects which engaged his active attention. It must be manifest, therefore, that John Britton's claims upon our gratitude are infinitely more weighty and numerous than words of mine can urge upon the present occasion. I can only sum up this hasty tribute to his memory by an expression of my confident belief that he was to this country infinitely more than that other great archæologist, whose loss we have had to deplore this session—Canina—was to his."

The council then submitted a proposition to the members present, to the effect, that it would be a graceful tribute of respect to the memory of one whose services to the profession have been of an unexampled character, if a memorial tablet were erected by the Institute, to commemorate those services, and to record their regard for Mr. Britton: and it was further suggested, that it would be expedient to make an application to the Dean and Chapter of Salisbury, expressing the hope that permission would be granted for the erection of the memorial in that cathedral, which is at the same time the mother church of the diocese, and of the county in which he was born, and also the first cathedral of which he undertook the graphic illustration. The proposition was received with acclamation, and will be acted on forthwith.

Mr. I'Anson then read a paper on "The Castle of Heïdelberg," to which we shall refer hereafter.

BRITISH ARCHÆOLOGICAL ASSOCIATION.

A MEETING of the Association was held at their rooms on Wednesday evening, the 14th, Mr. Godwin, V.P. in the chair, when the names of various new members were announced. At the request of the Council, the chairman announced the death of Mr. Britton, and sketched briefly his career,—a career, he said, which teaches us that the greatest disadvantages may be overcome by integrity, a clear head, and a determined will; and that it is not necessary to be either learned or rich to make a name that posterity will regard. Mr. Pettigrew addressed the meeting feelingly on the same subject.

Mr. Planché then read a very acute and elaborate paper "On the Sculptures in the West Front of Wells Cathedral," in reply to the work on the subject published by Professor Cockerell. Written in the mildest tone, and with an evident desire to avoid the least appearance of hostility, the paper was so complete a denial of the theory, and even of the facts, put forth by Mr. Cockerell, that it will demand the immediate attention of the learned professor if he desire to maintain the character of his book. Thanks, of more than ordinary strength, were voted to Mr. Planché for his Essay.

DEPARTMENT OF SCIENCE AND ART.

EXAMINATION OF TRAINING MASTERS.

IT is somewhat noticeable that within the last few years examinations should have come to be regarded as the most efficient tests, wherewith to discover the competency of men who are candidates for Government appointments.

The system is a healthy one; for, although it may sometimes result in barring from the service of the country, men possessing great though perhaps eccentric genius, yet it closes our Government departments against those who have no abilities; and whilst it is no surety for obtaining the best men for public services, it is a safeguard against the worst.

The anxiety shown by many architects for examination for diplomas in that profession shows how deeply the feeling for such a test has taken root, and it is to be regarded as a morally healthy sign, indicative of systematic study. For the knowledge which thus voluntarily seeks for a test must be conscious of its own power; although, perhaps, influenced to ask for the criterion by the undue success of those who possess neither knowledge nor power.

As a practical result of this movement, we may in future expect to find, in our public departments, men possessing *positive* as well as comparative merit.

Allowing all this as an argument for examination, we confess we were in some degree surprised in hearing of an examination in general knowledge having taken place at Marlborough House in October last, of the artists, who, as masters in the London schools of art, and students of the head school, compose the training-class of the Department of Science and Art. For we believe that previous to this there has been no instance of an examination, embracing branches of knowledge which have not in a great degree been necessary for the efficient discharge of those duties which devolved upon successful candidates; whilst this test, although comprising subjects which are regarded as very important items in an artist's education, yet had no very radical influence on the application of his art.

The examination embraced the ordinary subjects of a general education,—English history, arithmetic, &c.; and we subjoin Dr. Playfair's report:—

"As the result of a first examination, the returns may be considered satisfactory.

None of the students will be registered as having altogether failed, but those who stand with the letter C in the second class must come up for a new examination in all those subjects in which they are marked above 3 in the column of the table.

In subsequent examinations, those who only display the knowledge indicated by the letter C in the second class will not be admitted to the paid list of the training class until they have obtained a higher position."

The table of results is so constructed that the lowest marks indicate the highest positions—1 representing a high degree of attainment—so that the figure 3 would show comparatively a failure in that particular branch.

The letter C being the third division of the class, where it occurs in the second class, stands as a low mark.

In an examination of forty-two men, four only had this mark, and three of these through their bad penmanship—a common failing amongst artists.

THE ACCIDENT ON CORNHILL.

ON the 5th instant an accident occurred at Messrs. Sarl's premises, on Cornhill, which caused loss of life. The workmen in raising or setting a stone at the top of the house, without taking proper precautions, threw it off its balance, and it fell over the scaffold and killed a poor fellow who was standing below just under the edge of it. The scaffolding was formed as is now usually the case, in narrow thoroughfares, so as to allow passengers under it, and not to stop the pathway, the shop being kept open; and some correspondents of the newspapers have attributed blame to those concerned, for not making a temporary path in the roadway. Keeping open an attractive shop in such a position is decidedly objectionable; but it has been shown that the scaffold was a perfectly good one, and the arrangement the best under the circumstances.

BERWICK CORN-EXCHANGE COMPETITION.

A CORRESPONDENT, on the part of the company, writes,—"As the best practical answer to certain strictures which appeared a short time ago in the *Builder*, on the instructions to architects, issued for the proposed Corn-Exchange, in Berwick, it may be stated that fifty-four designs have been lodged. A definite selection has not yet been made."

WOLVERHAMPTON WORKHOUSE COMPETITION.

THE plans of Messrs. Bidlake and Lovatt were selected on Friday, the 9th, from four sets of plans submitted in competition for the extension of the Wolverhampton Workhouse.

MEETING OF UNEMPLOYED ARTISANS IN CONNEXION WITH THE BUILDING TRADE.

ON Monday, the 12th, a very large meeting of unemployed artisans was held in Smithfield. The meeting was called for the purpose of taking into consideration the present distressing position of that body.

Mr. Hugh Pearce was voted to the chair. He said at the present time there were upwards of 25,000 persons connected with the building trade in London unemployed. He should like to know how this depression had been brought about. It was all very well for the Government to state, and to blazon abroad to foreign nations, the glorious prosperity of this country; but let it look at home, and see the number of unemployed artisans before they entered into costly wars for what they called the independence and welfare of a people who, he (the chairman) had no doubt, were much better off than the workmen of this country. His suggestion was that they should apply *en masse* to the various unions for relief. They must remember that the poor-law was a national right. Let them ask what could be granted,—like men of common sense,—for what they required, and not waste their time and labour in discussing the Utopias of vain men, or the political crotchets of professional agitators. Hitherto Englishmen appeared to be actuated by false pride, for when out of work they seemed to think it a degradation to apply for relief at the union; but they should remember that the poor-law was a national institution, and that the relief it gave was their own. They should enforce that right when necessity compelled it, and then such a pressure would be brought to bear upon the ratepayers that the Government would be obliged to retrench some of its useless expenditure, and apply the saving to the construction of useful public works.

The following resolutions were afterwards proposed and carried:—

"That the unemployed workmen here assembled, being fit objects for relief under the Poor-law, should forthwith apply in masses at their various parishes and demand such casual support while out of work as they are by law entitled to, and in the meantime the Executive Council shall draw up a petition in the name and on behalf of the unemployed, praying her Most Gracious Majesty the Queen to call the attention of the Government to the necessity of employing the surplus labour population upon the waste lands of the country, granting them also the loan of a portion of the surplus revenue for draining and tilling the same, to the end that their present impending ruin may be prevented, and corn produced in sufficient abundance to meet the wants of all."

"That the Government open an extensive system of emigration for all those who, being unable to procure employment, do not wish to be put upon the land, but prefer to leave their native country; thereby to add to the wealth of the colonies, and be enabled to better their own condition at the same time."

HOLYHEAD HARBOUR.

THIS great national work, which is being carried out, under the immediate direction of the Board of Admiralty, by the Messrs. J. and C. Rigby, of Westminster, affords periodically, to the civil and military engineer, as well as to the scientific and intelligent inquirer, an opportunity of witnessing the effect of large quantities of powder brought to bear in the dislodgment of immense masses of the hardest description of quartz rock, amounting in several instances to upwards of 100,000 tons, another of which stupendous blasting operations was to take place on the 16th instant, at noon. This operation was to act upon a face of rock 115 feet in height, 210 feet in length, with an average line of least resistance of 25 feet, and was calculated to throw down upwards of 100,000 tons of rock, for transmission to the breakwater, with an aggregate charge, in the four compartments or chambers, of not less than 16,000lbs. of powder. Upwards of four million tons have been already dislodged by this means for the construction of the harbour, without failure and without accident.

SCENERY AT THE LYCEUM THEATRE.

THE transformation scene of the extravaganza-pantomime at this theatre, "Conrad and Medora," has been very much praised, and not improperly. As a series of mechanical arrangements and a piece of colour it is equally excellent. It presents five distinct movements, and is glittering and gorgeous, without glare or vulgarity. Some of the other scenery is also very good. Mr. Frederick Fenton has long been favourably known, but has never done anything so good as this before. Mr. Dillon, in his efforts to maintain the character of the theatre, in several cases very successful, must strive for accuracy in his scenery and costumes. He must not permit any more such blunders, for example, as some that were apparent in the piece called "The Cagot," for which, though laid in the fifteenth century, we had rooms of the seventeenth and eighteenth. The last scene had a Gothic screen and a Louis XVI. ceiling. We mention this, not to disparage, but to awaken attention.

THE PHOTO-GALVANOGRAPHIC PROCESS OF ENGRAVING.

LIGHT and electricity have been put into harness by Mr. Paul Pretsch, lately the manager of the Imperial Austrian Printing Office at Vienna, and trained to perform the united functions of the artist-draughtsman and engraver.

The first steps of this photo-galvanographic process are similar to those adopted by the glass-plate photographer. The operator coats a glass plate with a gelatinous solution, suitably prepared with chemical ingredients sensitive to light. These compounds form the coating material, which is allowed to dry upon the glass or other plate which is coated with it. When dry, the coated plate is exposed to the light in a copying frame, in contact with the print or drawing which is to be copied. After exposure, the plate exhibits a faint picture on the smooth surface of the sensitive coating, and it is washed with certain solutions, when the whole image comes out in relief, whilst the tints of the original are still maintained. When sufficiently developed, this relievo plate is dried and moulded. The mould is prepared for electric conduction, placed in the electrotype battery, producing a thin copper-plate or matrix, which is used for producing finally the intaglio printing plate.

With this printing process there is no fear of fading, as the plate impressions are in ink, and the

attention of an ordinary printer suffices to keep the pictures to the proper colour.

We have seen some remarkable specimens, especially from Gothic buildings, and look for great things from the process. The Company, amongst other works, propose to publish, from photographic originals "The Cathedral Antiquities of the British Empire;"—the plates to be engraved by the Company's patent process, on a scale of great magnificence.

Books Received.

Descriptive Essays; contributed to the "Quarterly Review." By SIR FRANCIS B. HEAD, Bart. In two volumes. Murray, Albemarle-street. 1857.

THIS "brood of literary chickens," as the author, with that pleasant pen of his, describes them, were all, save one, brought forth in that celebrated hatching-machine, "the *Quarterly*," and now they "migrate from their coop, to fare, in the wide world, for themselves." There is no fear of such lively chickens being unable to "pick up a living." Few of Sir F. B. Head's numerous readers will think it supererogatory to purchase a collected edition of his graphic essays merely because they have already perused them in their original "*Quarterly*" *nidus:* on the contrary, these are likely to be their most assured purchasers. The book contains several articles of special value to our own professional readers, such as those on "The Britannia Bridge," "The London and North-Western Railway," "The Air we live in," "The Electric Telegraph," and "Locomotion by Steam." There are also very interesting articles on the "Cornish Miners in America," on "English Charity," "The London Post-office," "The Red Man," "The Printers' Devil," "The Battle of Waterloo," and "British Policy,"—a "strange story," in which Canada, Lord Durham, and Sir F. B. Head prominently figure.

The Business Man's Note-Book and Desk Directory for 1857. Edited by JAMES HOGG, jun. Fellow of the Statistical Society of London, &c. Edinburgh: Hogg. London: Groombridge.

AT the end of last month Mr. Hogg's welcome aid to business was issued in a much enlarged and still more valuable form than heretofore. The Directory has grown into a thick volume of nearly 800 pages, containing an immense amount of useful matter. Unreadable and unreferrible blue-books are here by the score transmuted into a readable red-book of easy reference, teeming with the statistics of trade and commerce, agriculture, fisheries, mines, transport, banking, revenue and taxes, stocks and shares, foreign commerce and finance, British and foreign weights and measures, and calculating tables, tariffs and trade usance, &c. &c. From Mr. Hogg's known character for accuracy and industrious research, every confidence may be placed in the correctness of the vast mass of statistical and other information here embodied into a most valuable addition to the desk and the writing-table. With the Directory there is a cloth case, containing various tables and maps,—statistics of the British colonies,—map of the electric-telegraph system of Europe,—balance-sheet of nations,—table of Indian territories,—table of treaties and partitions,—war-tables, &c.

Useful Information for Engineers, with Appendices. By WILLIAM FAIRBAIRN, F.R.S. &c. Second edition. London: Longman and Co. 1856.

THE first edition of this valuable work, issued in December, 1855 (and noticed by us at some length shortly afterwards) has been already exhausted, and the present edition being called for has been issued in a cheap form, so as to secure the volume a still wider circulation, especially amongst those working engineers for whose advantage the lectures were originally delivered. For facility of reference, the order of the lectures has been changed, and at the end has been placed a short notice of the results of the experiments which Mr. Fairbairn recently conducted, at the request of the Royal Society and the British Association, on the resistance of cylindrical vessels to compression from an external and surrounding force. These experiments, it is believed, will modify generally received opinions as to the strength of boiler-flues and other cylindrical tubes similarly placed.

Visits to Remarkable Places. By WILLIAM HOWITT. Third edition. London: Longman and Co. 1856.

MR. HOWITT's two elegant volumes, on old halls, battle-fields, and scenes illustrative of striking passages in English history and poetry, have reached a third edition, issued, however, without note or comment, other than the brief advertisements of 1839 and 1841, which accompanied the two volumes as they were respectively first issued. The work is illustrated by numerous sketches of scenes and places, most of them exceedingly well known and appreciated. Alnwick is one of the places visited, and the graceful and original pen of Mr. Howitt is well adapted to enhance the interest which recent discussions have excited in respect to this famous spot in England's history. But indeed the whole work displays a rich field of historical and archæological matter, as must be evident from the mere mention of such names as Lindisfarne, Culloden and Flodden, Stratford-on-Avon, Hampton Court, Raby Castle and Brancepeth, Winchester, Seaton Delaval, Berwick and the Borders, and many more that might be named with these. The book is beautifully got up, and full of the interest attached to our ancient architectural relics and ancestral homes.

Miscellanea.

THE LATE MR. THOMAS SEDDON, ARTIST.—Not very long ago we spoke of some pictures of great merit made in the Holy Land by Mr. Thos. Seddon; and we have now to mention, and we do so with great sorrow, that Mr. Seddon set off last autumn on a second professional journey to the East, and, very shortly after his arrival, died at Cairo, from an attack of dysentery, on the 23rd November. Unhappily, too, he leaves a widow and an infant daughter. Mr. Holman Hunt, Mr. Madox Brown, and other gentlemen who knew Mr. Seddon's worth, are anxious to do something which shall be honourable to his memory as an artist of elevated aims and of undaunted energy, and which shall at the same time be useful to the wife and child who have so suddenly become widow and orphan. It is proposed to hold an exhibition of the works which Mr. Seddon has left; to purchase from his widow, by subscription, the principal work, an oil-picture of Jerusalem, for presentation to some public institution; and, if any surplus funds should accrue from subscription, to request Mrs. Seddon's acceptance of them. Resolutions to this effect will be submitted to the meeting, which is fixed for the 2nd of February. Mr. W. M. Rossetti, of 45, Upper Albany-street, Regent's-park, has agreed to act as honorary secretary, and will receive the names of any gentlemen willing to assist in the good object proposed.

A BUILDER'S CLAIM.—In the Court of Passage, at Liverpool, on Thursday in last week, William Bateman, a Liverpool builder, claimed from Mr. John Moss the sum of 291*l.* 11s. 4½d. for altering and repairing his residence, Beech-house, Aigburth. The sum of 150*l.* had been paid into court, and to the rest of the claim the defendant pleaded that the plaintiff agreed to complete the alterations before the 10th May, 1856, or in default to forfeit seven guineas for every week's delay beyond that date, and that penalties had occurred under that agreement sufficient to cover the amount. The plaintiff replied that the delay was occasioned by the defendant's own default, he having ordered other alterations to be made of such a nature as to render it impossible to complete the alterations originally contemplated within the specified time. The plaintiff's case having proceeded for a short time, it was agreed that the matter should be referred to Mr. Culshaw, architect and surveyor, and a verdict for the plaintiff was entered, subject to his decision.

THE LATE MR. BREBNER, CONTRACTOR.—We are sorry to announce the death of Mr. Brebner, railway contractor, which took place last week, at his residence at Badenscoth. Mr. Brebner has been in delicate health for some time, but the disease under which he fell was a virulent form of typhus fever. Mr. Brebner was contractor for the Banff, Macduff, and Turriff Extension Railway, which is far advanced, and which should be opened by the 1st of June next. He was also contractor for the Alford Valley Railway; and had besides a share of the contract of the Inverness and Aberdeen Junction Railway.

FALL OF AN OLD HOUSE IN SPITALFIELDS.—On Sunday last a dilapidated building, one of a number of extremely old houses, in Dorset-street, Spitalfields, and occupied by no less than sixteen families, was destroyed by the fall of its lofty stack of chimneys through the floors, killing a child and seriously injuring a number of the poor residents. An inquiry will be made.

THE CRYSTAL PALACE.—Many, we dare say, have wondered and inquired what *could* be the use of those long corridors through which Crystal Palace frequenters must tramp — we had almost said for miles—ere the glories of the interior open on their gaze. Such of them as have visited the Palace within the last week, must have had this important question satisfactorily solved by the interesting sight which then presented itself to the eye, and the not quite so interesting sounds which *babel'd* in their ear. Sir Joseph Paxton must have clearly had visions of poultry exhibitions in his mind's eye (as well as flower-shows and picture galleries), when he planned these "long drawn" corridoric appendages to the Crystal Palace. They are admirably suited to their purpose, and vast as is their expanse, the wider parts were more than filled with thousands of not very "dumb animals," the eternal chatter and screech of which was (at first) really amusing, but at last scarcely tolerable. We do not pretend to be judges of poultry, at least in their feathery dresses, but this is said to have been one of the most important exhibitions, at least in number, that ever was held.

THE ARCHITECTURAL EXHIBITION.—On Tuesday evening last, the Rev. J. L. Petit, gave an elaborate lecture "On the Application of Gothic Architecture to civil and domestic Purposes," which was illustrated by a very large number of his own sketches. We shall print a portion of it in Mr. Petit's own words in an ensuing number.

SALE OF MODERN DRAWINGS.—We go a little way out of our course to point attention to a sale of drawings and other objects of art by Mr. Fredk. D. Godwin, advertised for Thursday, the 29th inst. in Old Bond-street, because we happen to know that the collection is genuine, and includes some good specimens. There are drawings by Farrier, Robins, Dewint, Herbert, Howes, Varley, Sidney Cooper, Weigall, E. Corbould, Williams, David Cox, Dujardin, Warren, and others, together with some bronzes and Sèvres and Dresden china.

ARCHITECTURAL INSTITUTE OF SCOTLAND.—A meeting of the Architectural Institute of Scotland was held on the 13th, Sir John Stuart Forbes in the chair, when Bishop Terrot read a paper "On the Elements of Architectural Beauty, in reference to the recent Structures in Paris."

CONSECRATION OF ST. PETER'S CHURCH, NOTTING-HILL.—The new church of St. Peter, which has just been erected in the rapidly-extending district of Notting-hill, was consecrated last week by the Bishop of London. A district for the new church has been assigned out of the parish of Kensington.

CHESTER ARCHÆOLOGICAL SOCIETY.—The monthly meeting of this society was held in the City Newsroom, Chester, on Monday evening before last. Dr. Moffat, of Hawarden, read a paper on "The Origin of the Arch," tracing its use back to the most remote antiquity. Mr. Hicklin followed with a paper on "The Benedictine Abbey of St. Werburgh," announcing it as the prelude of a more important dissertation on the monastic system generally. Mr. T. Hughes then introduced some particulars relative to the "Cowpers of Overleigh," a family long connected with the local government of Chester.

LINCOLN DIOCESAN ARCHITECTURAL SOCIETY.—As the new rooms of this society in Lincoln are not ready, its bi-monthly meeting was held on Friday, January 2nd, at Mr. Loder's, near the Stone-bow, which was largely attended, and, in the absence of Sir Charles Anderson, the Rev. F. Massingberd took the chair. A total of forty-three members have joined the society during the last two months. Various plans and designs of proposed works were exhibited, and a large number of designs for head-stones was submitted by the honorary acting secretary, which he proposed should form a portion of a manual for the use of Burial Boards, masons, &c. The secretary announced a proposal that had been made to endeavour to save the west front of Croyland Abbey from falling.

COLUMNS IN SUSPENSE.—Stop him! Stop him! Where *are* the police? or are there none at South Kensington? Talk of the abolition of capital punishment! when some (possibly ticket-of-leave) man has actually constructed an order of columns, on trusses, in the first-floor of the elevation of the two large houses on Lord Harrington's property, on the very spot which is to be consecrated to our art treasures! After this the garotte will lose its terrors — the new horror will be the suspended columns of South Kensington. The criminal is still at large.—MARY ANN SYKES, School of Design.

TAUNTON CHURCH TOWER.—It has at length been resolved, all but unanimously, to rebuild rather than attempt to repair the tower of St. Mary's Church, Taunton. A public meeting, numerously attended, was held on Wednesday in last week, Sir Peregrine Acland, Bart. in the chair, when the report of the churchwardens, recommending the rebuilding of the tower as the safest and wisest course, and that in accordance with the opinion of eminent architects, both metropolitan and local, was read to the meeting. The report stated that the cost of the proposed repair or restoration was estimated at from 3,500*l.* to 4,000*l.* and of rebuilding on the original design, 6,000*l.* to 7,000*l.*; both estimates exclusive of architect's commission. Responsible contractors, it was added, were ready to undertake the rebuilding on the estimate stated. Contributions towards rebuilding had been already volunteered to the extent of nearly 2,000*l.* while for repairing no pecuniary aid whatever had as yet been offered. The bishop of the diocese moved the adoption of the report, which was carried, only three hands having been held up against it. It was then unanimously resolved that strenuous efforts be made to increase the subscription list already opened. In order that Messrs. Scott and Ferrey's views on the subject may not be misunderstood, we shall endeavour to find room for their report next week.

THE IRON TRADE.—At the quarterly meetings recently held no alteration in the previously declared prices was made. The trade is believed to be rather looking up. There is an increase of orders. The steadiness in nominal prices during the year just past, notwithstanding repeated attempts of reckless speculators to drag the market back into that feverish, gambling state for which the iron trade was for years notorious, is certainly promising, and forms a remarkable contrast to former doings in the trade.

COPPER.—Another advance in the price of copper is said to be impending: it is difficult to obtain more than small quantities at present prices, and the smelters' agents intimate that the article is scarce.

ECONOMIC LIBRARY OF WORKS AS TO WORKING CLASSES.—It is desired to form, in the library of the Society of Arts, Adelphi, a special collection of English and foreign publications relating to the condition of the working classes, and the means for improving it. As this plan can only be carried out to full advantage by extensive co-operation, persons who can supply, or obtain through their friends, publications or documents of the nature pointed out in a summary which is being circulated by the Society of Arts, are invited to forward them to the secretary. Further indications will be found in a printed list of papers already presented to the society, and of which copies may be had on application to the secretary. Our interest in the homes of the working-classes induces us to hope that extensive co-operation will soon lead to the full realization of so useful a scheme.

AN ENEMY BY THE HEARTH.—A few nights since the Great Northern Railway station at Lincoln narrowly escaped being burnt down. In one of the rooms a large fire had been left burning through the night for those who came by the early morning trains. At five in the morning the watchman smelt smoke, and discovered that the heated hearthstone had set fire to the rafters under the floor.——A house in Bond-street, London, was nearly burnt down by the same means a week ago. The sapient masons of some years since had laid the hearth-stone on pieces of wood, and these became ignited.

SCRIPTURAL MUSEUM. — ST. MARTIN'S HALL, LONG-ACRE. — Sir Henry Rawlinson delivered a lecture on Thursday night, in this hall, of considerable length and of a very erudite character, on "Recent Oriental Discoveries in relation to the Bible." The Lord Mayor presided. The three points on which Sir Henry mainly argued were the ethnology, geography, and history of the country of Babylon. He showed how the slab-stones and other monuments found in Palestine by himself and Eastern explorers verified the statements in the Bible, and mentioned a number of singularly remarkable coincidences between the Assyrian discoveries and the accounts in Scripture.

TESTIMONIAL TO AN EMPLOYER.—An illustration of good feeling between employer and employed has been brought under our notice. The "assistants, artisans, and workmen," of Mr. D. J. Humphris, builder, of Cheltenham (in number about seventy) lately presented him with a New Year's Gift in the shape of a timepiece. The present was accompanied with a suitable address, in which, after referring to the cordial relations which had always existed between them, the donors thus alluded to an institution which had been formed among them through Mr. Humphris's instrumentality:—"We must express [says the address] our best thanks to you for organising and maintaining the Sick Fund and the Savings' Fund, in your establishment, which are productive of much good to the members, both in sickness and in health."

PREVENTION OF SCAFFOLDING "ACCIDENTS."—A kindly-disposed "Londoner," who made some useful suggestions in the *Builder*, of 22nd November last, as to the advantage of rope nets in connection with scaffolding, has been at the trouble and cost of having his suggestions printed for distribution in a more detailed form, as regards front-netting, under-guarding, upright-netting round the sides and ends of the scaffolding, &c.; and recommends that on all scaffoldings covering the public footway, and under which persons are passing, especially in London, a tarpaulin should invariably be laid down to prevent the fall of bricks or other articles, as well as annoyance from dust, &c.

BRONZE IN ENGLAND.—Why are not all our statues which are exposed to a London atmosphere, *actually of iron?* To that complexion bronze, with us, soon comes. Witness the bright-as-a-new-farthing statue of Napier, when erected some few weeks ago, and its present dingy-iron appearance. The saving in cost would go far to supply the wanting statues on the remaining pedestals in Trafalgar-square.—Q.

SOMERLEYTON HALL, SUFFOLK.—Reference having been made recently to the library at the seat of Sir Morton Peto, bart. as a good specimen of the time of James I. and as being lined with carved oak, we are asked to mention that the whole of the carving and furniture, which is all of the same character, was designed and executed by Mr. J. M. Willcox, of Warwick, as well as that in the drawing-room, boudoir, &c.

TENDERS

Additions to St. Helen's Church, and a dwelling-house attached, at Sutherland-place, Bayswater; Mr. H. Clutton, architect:—

Lucas	£7,164	0	0
Brass	6,742	0	0
Macey	6,370	0	0
White	6,224	0	0
I'Anson	5,976	0	0
Myers	5,900	0	0
H. and R. Holland	5,899	0	0

For the works to be done for the Lewisham Cemetery, in drainage, including walls, road-making, &c.:—

Goodison	£4,683	0	0
Cole	4,665	0	0
Evans	4,280	0	0
J. Murray	4,250	0	0
Cobham	4,141	0	0
Bennett	4,134	0	0
G. Murray	4,000	0	0
Patrick	3,868	0	0
Newman	3,779	0	0
Dethick	3,714	0	0
Marshall	3,373	0	0

For alterations to premises, Caroline-place, Hampstead-road; Mr. C. Broadbridge, architect:—

Lee and Laver	£1,098	0	0
Lawrence	1,095	0	0
Lovell	1,190	0	0
Roberts	875	0	0

TO CORRESPONDENTS.

"G. W. and Co."—"A. and C."—"J. V."—"B. and L."—"P. R."—"E. R. R."—"T. M."—"G. G. W." (we are unable to assist)—"Centurion."—"S. B. B."—"W. R."—"E. T. L."—"Architectus" (we have applied for information).—"J. C."—"G. A. J."—"C. C."—"C. T."—"R. F."—"Sir J. B."—"Mr. R."—"W. B."—"J. W. P."—"R. H. S."—"W. R. C."—"W. W. and Son"—"Mr. W."—"B. F."—"G. J."—"J. L. P."—"E. T. O."—"J. U."—"J. R." (the "style" of the Panopticon is Saracenic).—"J. H. G." (thanks).—"W. A. B."—"E. H." (can send the offered instructions to us).—"An Old Subscriber and Architect."

"*Books and Addresses.*"—We are forced to decline pointing out books or finding addresses.

NOTICE TO SUBSCRIBERS.—A title-page in colours for the last volume may be obtained *gratis*, on personal application at the Office, by those who prefer it to that which accompanied the index in the closing number. Covers for the volume may be obtained at the Office, price 2s. 6d. or the Publisher will bind it for 3s. 6d. The complete volume may be obtained, price 21s.

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Inch Yellow Flooring	18s. per square.
4-inch ditto	15s. "
Pine Plank, 12 3 by 11, from	£21 per 120
Yellow Deals, from	20 "
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¾-inch white, 13s. 6d. per square; ¾-inch white, 15s. per square; 1-inch white, 18s. per square; ¼-inch yellow, 15s. per square; ¾-inch yellow, 16s. 6d.; 1-inch yellow, 20s.
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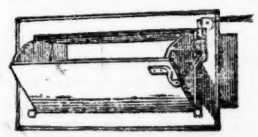

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